An Experiment Concerning the Progreſs *of* Artificial Congelaciation, *and the remarkable Accidents, therein obſerved by the* Florentin *Philoſophers, and publiſh't in their* Saggi di Naturali Eſperienze p. 147; *now Engliſh't for the further Tryal and Obſervation of the Curious here.*

THe firſt Veſſel, we uſed (*ſay thoſe Eminent Academiſts*) for this Experiment, was a Globe of Chryſtal, whoſe Diameter was $\frac{1}{3}$ of a *braccio**, with a long ſtreight neck of about a *braccio* and an half, graduated into ſmall parts. Having fill'd it with common water, up to the ſixth part of the neck, we put the Globular part into Ice and Salt, after the uſual manner of artificial Freezing of Liquors, and began very attentively to obſerve all the motions of the water, from its level. It was ſufficiently known before, that Freezing worketh in all Liquors a contraction; as alſo, that in the paſſage, which the water maketh from being ſimply cold to the leaving of its fluidity, and taking a conſiſtency and hardneſs by congelation, it not only returns to the bulk, it had before it was frozen, but ſwells to a bigger; ſince we ſee, that veſſels not only of glaſs but of mettal are forcibly broken thereby. But what might be the limits and period of theſe various alterations, which the Cold works therein, we as yet did not know; nor is it poſſible to attain that knowledge in opacous veſſels. We therefore, that we might not want that inſight, which appear'd to be the Soul of all theſe Experiments, had recourſe to Chryſtal and Glaſs, hoping that by the tranſparency of that body we ſhould be informed of the whole progreſs; in regard that at every motion, which ſhould appear in the water of the neck, we might quickly take the Globe out of the Ice, and therein obſerve the alterations correſpondent thereto. But the truth is, that we took more pains, than we can expreſs, before we could find out any thing certain touching the periods of theſe accidents.

* *Which is near three Engliſh Inches.*

And

And to deliver more diſtinctly the ſucceſs, you are to know, that in the firſt immerſion of the Globe, as ſoon as it touched the Icy water, there was obſerved in the water of the Glaſſes-neck a ſmall riſing, but that ſufficiently quick; after which, with a motion regular enough, and of middle velocity, it retired back to the Globe, till being come to a certain mark, it continued not to deſcend any further, but ſtopp'd there for a while, being altogether, as far as we could ſee, moveleſs. Afterwards, little by little it was ſeen to begin to riſe again, but with a very ſlow motion, which was in appearance even and regular; from whence, without any proportioned acceleration, it ſuddenly and furiouſly ſtarted upwards; in which time it was impoſſible to follow it with our eyes, it running up with this impetuouſneſs, in an inſtant, as 'twere, through ſeveral tens of the marked degrees. And as this violence began in a moment, ſo in a moment it ended; foraſmuch as from this very great velocity it ſuddenly paſſed to another degree of motion, which though nimble enough, was yet incomparably leſs than the precedent; and going on to riſe in this degree, it went to the top of the next, and at laſt run over.

All the while, that theſe things happen'd, there were at times ſeen on the top of the water ſome bubbles, either Aereal, or of another more ſubtile matter, now in a greater, then in a leſſer plenty: And this ſeparation did not begin till the water had begun to take a briſk cold; as if the force of ſuch a cold had the power of ſtraining ſuch matter, and ſevering it from the water.

Now being deſirous to ſee, whether thoſe alterations kept among themſelves any kind of Analogy, we began to reiterate the conglaciations, and no ſooner was one Ice deſtroyed, but we ſet it to freeze anew: And the water went to congele again in the ſame order of alterations; which yet did not every time return to the ſelf ſame points or degrees in the neck: Which made us believe, that they had

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no conſtant and ſtable period, as reaſon ſeemed to perſwade us they had. Mean time it fell out in repeating theſe Experiments, that having once unawares let the water of the Globe freeze near to the neck, the Globe burſt: Whereupon another being taken of a leſs ſize, to the end that the Cold might more ſpeedily and more eaſily get into all the water, and the neck of it being two *braccia's* long, that it might not run out; it was filled with water out to the 160th degree, and then put into the Ice. Here obſerving it with the beſt attention we could, we found *firſt*, that all the accidents of ſubſiding, riſing, reſting, ſtarting upwards, running, retarding, did alwayes follow in the ſame points of the neck of the Globe, that is, when the ſurface of the water ſtood at the ſame degrees; provided, that in the act of ſetting it in the Ice, care were taken, to put it to the very ſame degree, where it was, when put into the Ice the time before, that is to ſay, to the ſame temper of heat and cold: In which caſe the whole veſſel might be conſider'd as a very nice Thermometer, by reaſon of the great capacity of the Globe, and the exceeding ſtreightneſs of the Neck. This being provided for, we began to take notice of the preciſe time of Congelation; which to find aright, we did after every little ſpace of time take up the Globe out of the Ice; but how frequently ſoever we made ſuch obſervations, we never could ſo hit it, as to ſee even the leaſt veine of froſt, but alwayes it was either all fluid, or all frozen. Whence we conjectured, that the work of Congelation was done in a very ſhort time, and that he, who ſhould with taking pains have the luck to take the Globe out of the Ice in that nick of time, when the water ſhould receive that ſo ſudden change, would certainly find ſome thing very notable thereby. And becauſe by the ſo often taking out and putting the Globe into the Ice, the whole period of its changes was diſordered; we let it return to juſt the ſame mark as it was at firſt, and then placing it into the Ice, we fixed it to that degree, in which

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it was wont to take that very impetuous motion, and half a degree before it arrived thereto, we took it out. Then looking conſtantly with a carefull eye upon the water in the Globe, which by reaſon of the tranſparency of the Chryſtal was plainly ſeen to be yet altogether fluid and clear, the water, though now out of the Ice, did by the operation of the introduced cold, (after it had attained to its due point with a ſwiftneſs imperceptible to the Eye, the tranſparency within the Globular part being loſt, and it ſelf in an inſtant, as 'twere, deprived of its motion) totally conglaciate. Which Experiment we tried over and over again, and found it alwayes ſucceed alike.

An Extract of a Letter of Monſieur Hevelius, *concerning his Obſervations of the* Moon's Eclipſe, *on* Septemb. 29. *ſt. n.* 1670. *and the* Conjunction *of* Venus *and the* Moon, *on the* 11*th of* Octob. *ſt. n.* 1670; *as alſo ſome remarks about the* New Star *near the* Beak *of the* Swan, *and that other in the* Neck *of the* Whale: *together with ſome other particulars of a Philoſ. nature. Here deliver'd in the ſame Tongue, in which it was written.*

—*Non potui Reſponſum tuum ad meas ultimas exſpectare, quin rurſus ad Vos ſcriberem, deque recentioribus quibuſdam* Phœnomenis *& Obſervationibus, hîc à me feliciter habitis, certiores redderem; inprimis cum videam, meas quales quales Animadverſiones Cæleſtes Illuſtriſſimæ noſtræ* Societati Regiæ *hactenus non omninò diſplicuiſſe.*

Primò, *die* 29. Septembris *ſt. nov. mane*, Eclipſin Lunæ *Cœlo perquam ſereno, ab initio uſque ad finem, ex voto obſervavi. Initium ejus incidit horæ* 2. 22′; *quanquam id ipſum vix omnino accuratè obſervari potuerit, ob Umbram Terræ dilutiſſimam: Siquidem, durante Eclipſi, tota Umbra adeò tenuis erat atque diluta, ut omnes præcipuas maculas per eam, meo viginti pedum Tubo, quin & brevioribus optime conſpicere potuerim.*